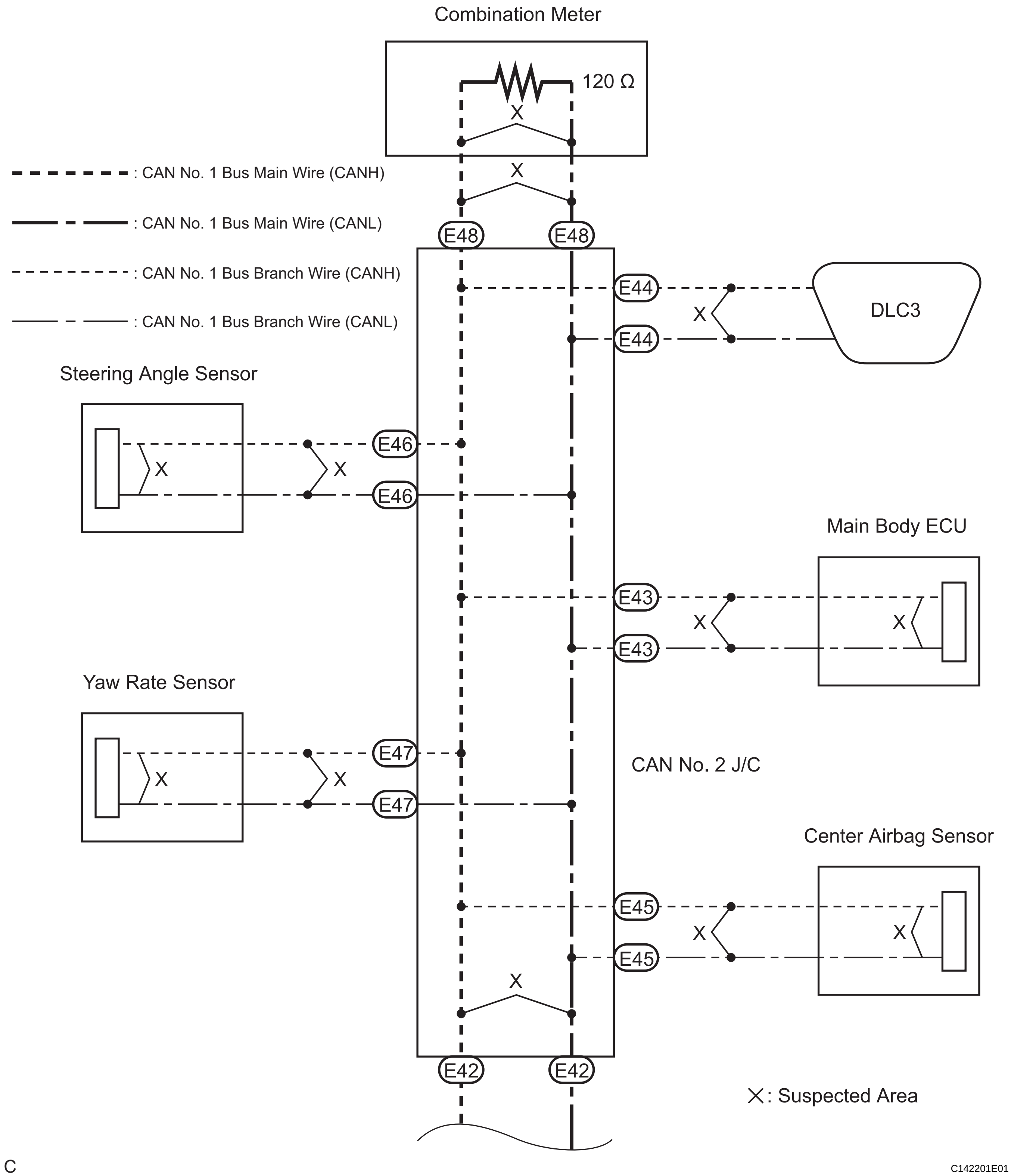
Short in CAN Bus Lines

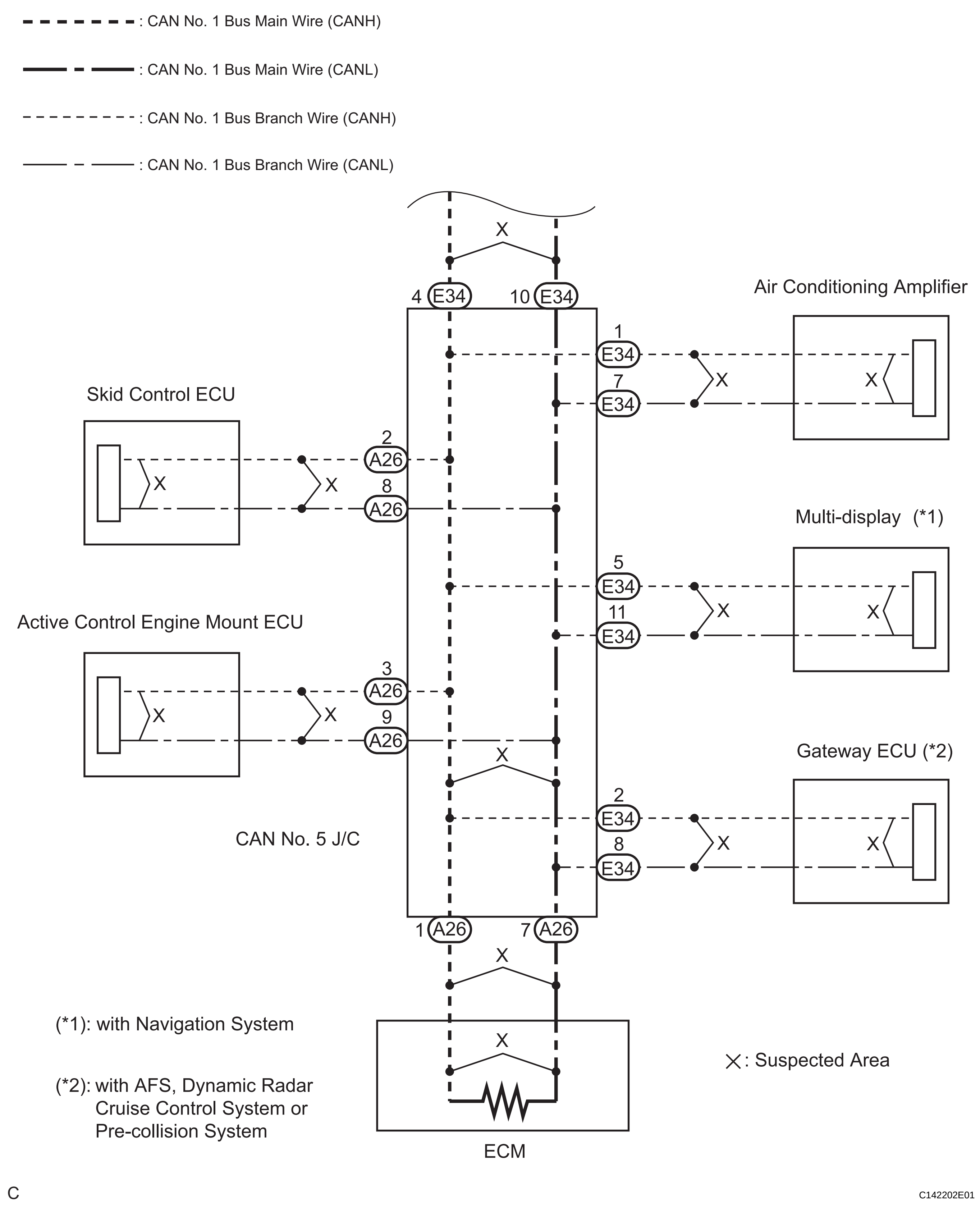
DESCRIPTION

The CAN bus wires are considered to be shorted when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.

Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.	1. Short in CAN bus wires 2. Skid control ECU 3. Steering angle sensor 4. Yaw rate sensor 5. ECM 6. Combination meter 7. Main body ECU 8. A/C amplifier 9. Center airbag sensor 10. Gateway ECU 11. Active control engine mount ECU 12. Multi-display 13. CAN No. 2 J/C 14. CAN No. 5 J/C

WIRING DIAGRAM



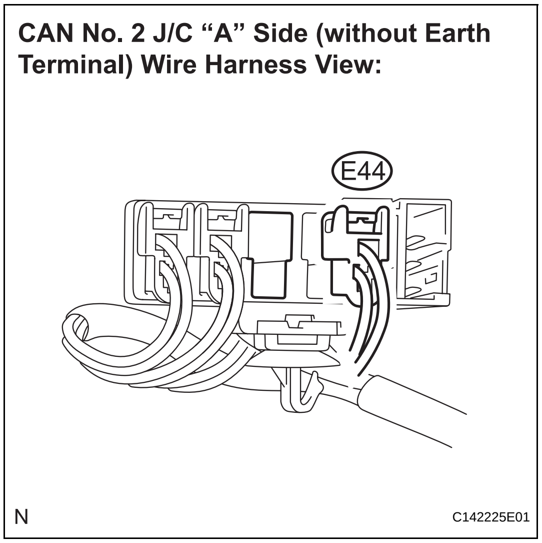

: CAN No. 1 Bus Main Wire (CANH)
: CAN No. 1 Bus Main Wire (CANL)
: CAN No. 1 Bus Branch Wire (CANH)
: CAN No. 1 Bus Branch Wire (CANL)
X
4 E34
10 E34
Air Conditioning Amplifier
1 E34
7 E34
X
X
Skid Control ECU
2 A26
8 A26
X
X
Multi-display (*1)
5 E34
11 E34
X
X
Active Control Engine Mount ECU
3 A26
9 A26
X
X
X
Gateway ECU (*2)
2 E34
8 E34
X
X
CAN No. 5 J/C
1 A26
7 A26
X
X
ECM
(*1): with Navigation System
(*2): with AFS, Dynamic Radar Cruise Control System or Pre-collision System
X: Suspected Area
C
C142202E01

INSPECTION PROCEDURE

NOTICE:

Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the engine switch, any other switches, or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

1 CHECK FOR SHORT IN CAN NO. 1 BUS WIRE (DLC3 BRANCH WIRE)

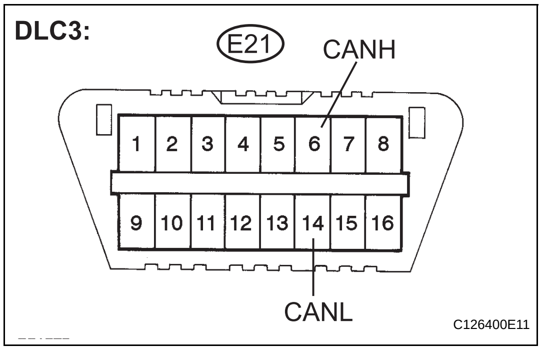

CAN No. 2 J/C "A" Side (without Earth Terminal) Wire Harness View:
E44
N
C142225E01

(a) Turn the engine switch off.

(b) Disconnect DLC3 branch wire connector E44 from the CAN No. 2 J/C "A" side (without earth terminal).

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**



(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

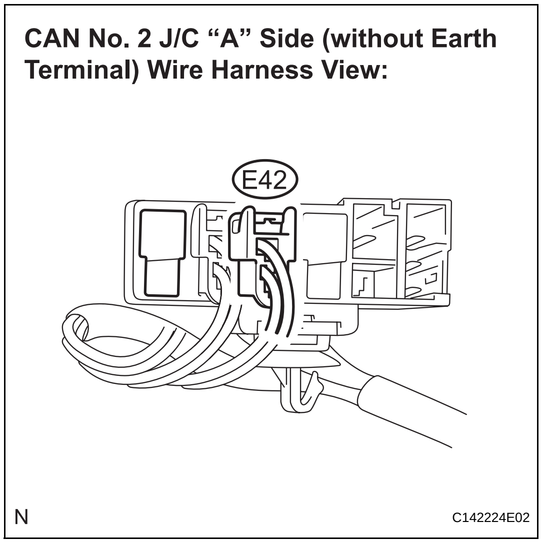
Tester Connection	Condition	Specified Value
E21-6 (CANH) - E21-14 (CANL)	Engine switch off	1 MΩ or higher

(d) Reconnect DLC3 branch wire connector E62 to the CAN No. 2 J/C "A" side (without earth terminal).

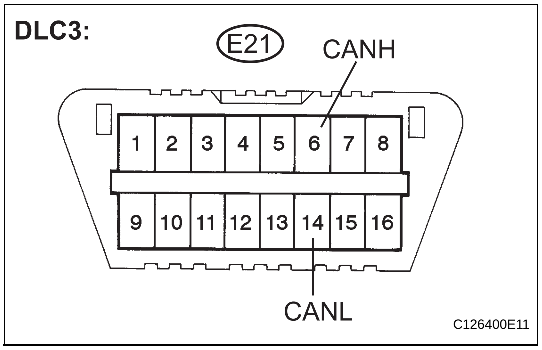
NG **REPAIR OR REPLACE DLC3 BRANCH WIRE OR CONNECTOR**

OK

2 CHECK FOR SHORT IN CAN NO. 1 BUS WIRE (CAN NO. 2 J/C SIDE)


CAN No. 2 J/C “A” Side (without Earth Terminal) Wire Harness View:
E42
N
C142224E02

(a) Disconnect CAN main bus wire connector E42 from the CAN No. 2 J/C "A" side (without earth terminal).



(b) Connect the probes of an ohmmeter to terminals 6 (CANH) and 14 (CANL) of the DLC3.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E21-6 (CANH) - E21-14 (CANL)	**Engine switch off**	**108 to 132 Ω**

OK **Go to step 7**

NG

3 CHECK FOR SHORT IN CAN NO. 1 BUS WIRE (CAN NO. 2 J/C BRANCH WIRE)

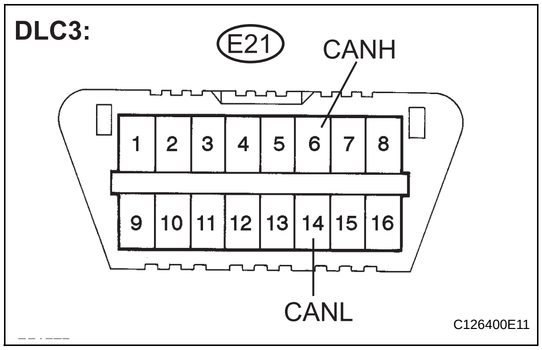
(a) Reconnect CAN main bus wire connector E42 to the CAN No. 2 J/C "A" side (without earth terminal).

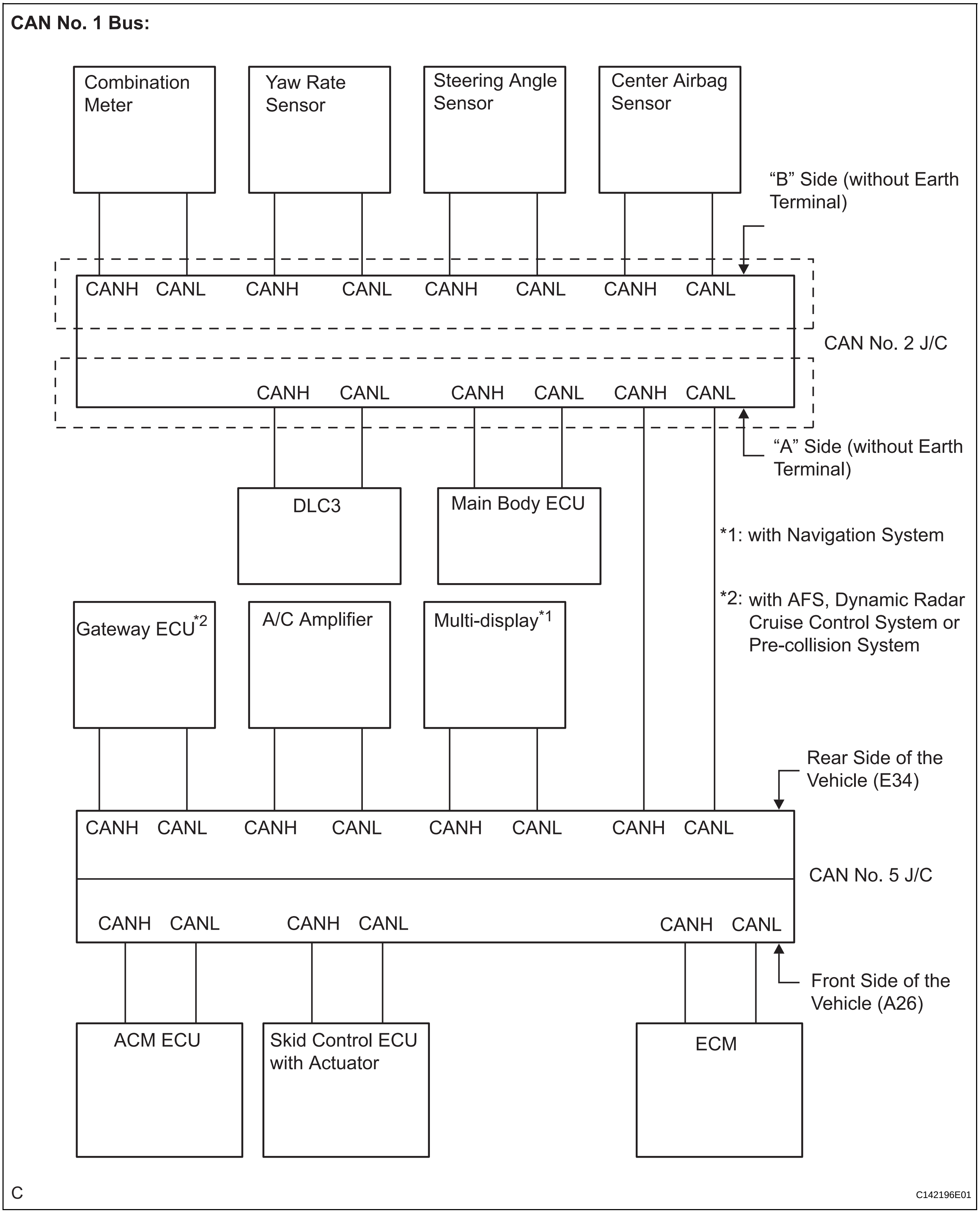
(b) Connect the probes of an ohmmeter to terminals 6 (CANH) and 14 (CANL) of the DLC3.

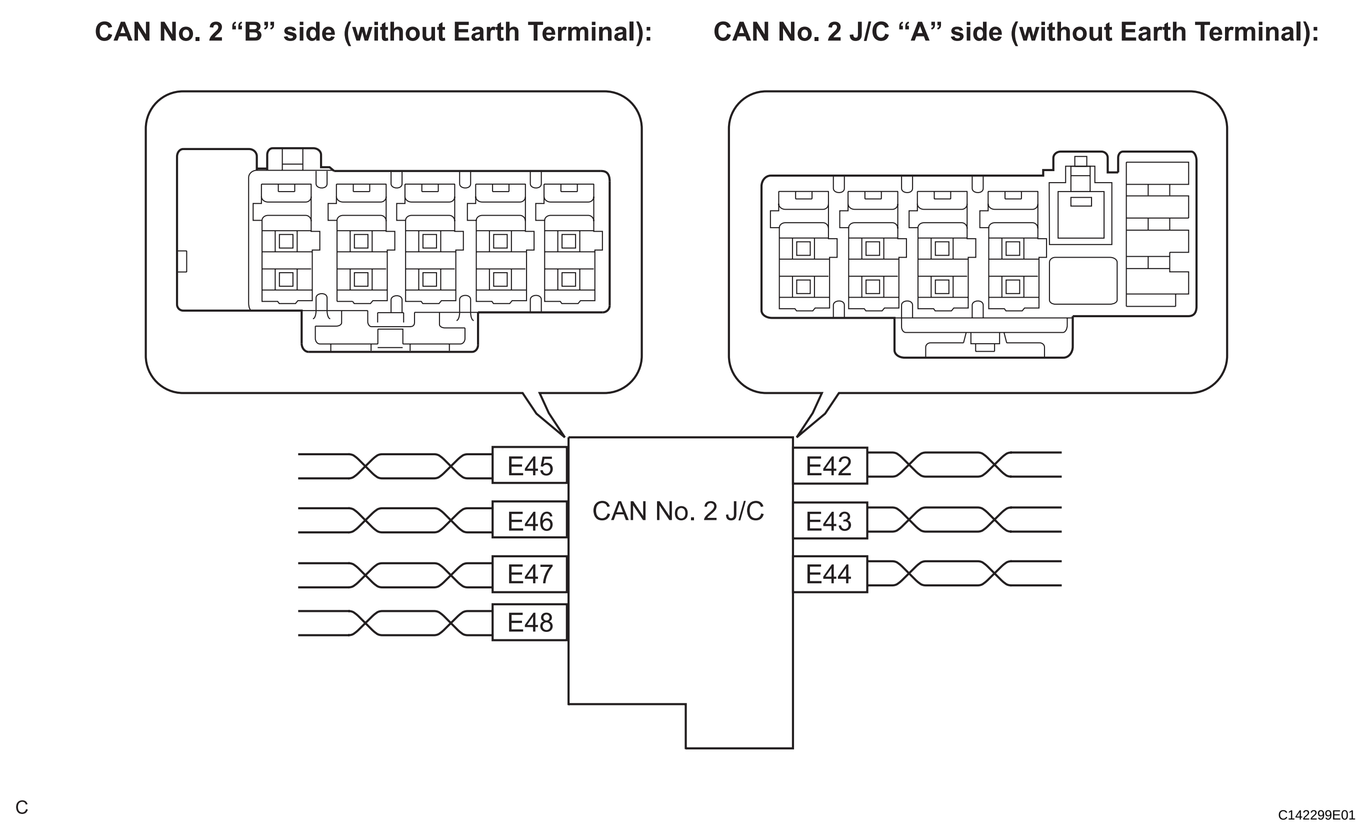
(c) While observing the resistance value shown on the tester, disconnect connectors E43, E45, E46, and E47 from the CAN No. 2 J/C one by one until the resistance becomes normal (between 54 and 69 Ω).

HINT:

Disconnect the branch wire connectors other than those of the DLC3.




CAN No. 1 Bus:
Combination Meter
Yaw Rate Sensor
Steering Angle Sensor
Center Airbag Sensor
"B" Side (without Earth Terminal)
CANH
CANL
CAN No. 2 J/C
"A" Side (without Earth Terminal)
DLC3
Main Body ECU
*1: with Navigation System
*2: with AFS, Dynamic Radar Cruise Control System or Pre-collision System
Gateway ECU*2
A/C Amplifier
Multi-display*1
Rear Side of the Vehicle (E34)
CAN No. 5 J/C
Front Side of the Vehicle (A26)
ACM ECU
Skid Control ECU with Actuator
ECM
C
C142196E01


CAN No. 2 "B" side (without Earth Terminal):
CAN No. 2 J/C "A" side (without Earth Terminal):
E45
E46
E47
E48
CAN No. 2 J/C
E42
E43
E44
C
C142299E01

CAN No. 2 J/C Connector ("A" side, without earth terminal)	Connector Color	Color (CAN-H Side)	Color (CAN-L Side)
CAN No. 1 Bus Wire (E42)	White	B	W
Main Body ECU (E43)	White	BR	GR
DLC3 (E44)	White	LG	P

CAN No. 2 J/C Connector ("B" side, without earth terminal)	Connector Color	Color (CAN-H Side)	Color (CAN-L Side)
Yaw Rate Sensor (E47)	White	O	P
Center Airbag Sensor (E45)	White	G	Y
Steering Angle Sensor (E46)	White	V	P
Combination Meter (E48)	White	B	W

NOTICE:
Do not reconnect the disconnected connectors until this inspection is complete because there may be a short in 2 or more branch wires.

Result

Symptom	Proceed to
The resistance is still below 54 Ω when all the specified connectors are disconnected. (There are no shorts in the branch wires.)	**A**
The resistance becomes normal (between 54 and 69 Ω) when a connector is disconnected. (There is a short in one or more of the branch wires.)	**B**

(d) When there is a short in one or more of the branch wires:

(1) Reconnect all of the connectors to the CAN No. 2 J/C, except for the one that was disconnected last (the short-circuited bus wire). Check that the resistance shown on the tester is normal (between 54 and 69 Ω) to confirm that there is a short in one branch wire only.

HINT:

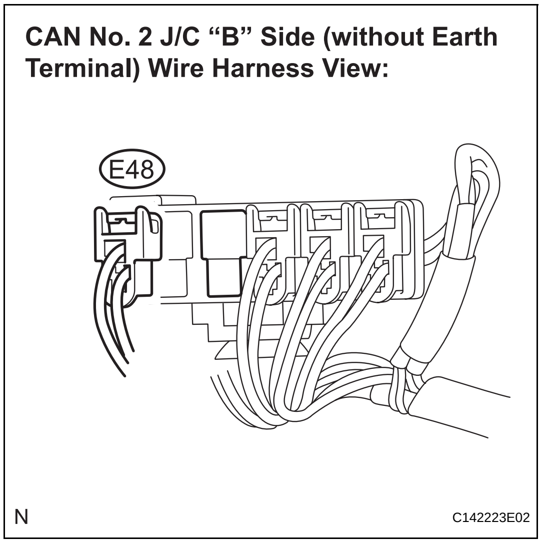
- The connectors connected to the CAN No. 2 J/C can be distinguished according to the color of the communication bus wires and the shape of the connectors.
- Reconnecting the connectors to non-specified positions on the CAN No. 2 J/C does not affect system operation. However, it is preferred to reconnect the connectors to their specified positions to avoid negative effects on the wiring such as tension on the wiring harnesses, and to make future maintenance easier.

B → **Go to step 12**

A

4 CHECK FOR SHORT IN CAN NO. 1 BUS WIRE (COMBINATION METER ECU MAIN BUS WIRE)

CAN No. 2 J/C “B” Side (without Earth Terminal) Wire Harness View:

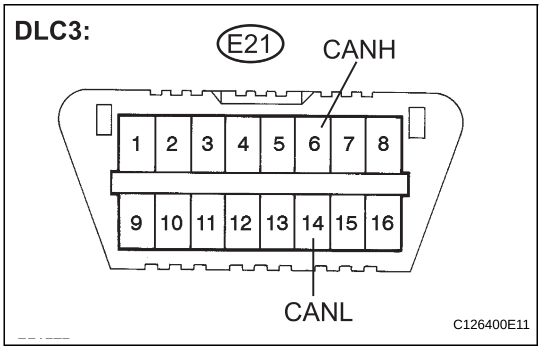


(a) Disconnect combination meter main bus wire connector E48 from the CAN No. 2 J/C "B" side (without earth terminal).

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E21-6 (CANH) - E21-14 (CANL)	Engine switch off	108 to 132 Ω

NG → **REPLACE CAN NO. 2 J/C**

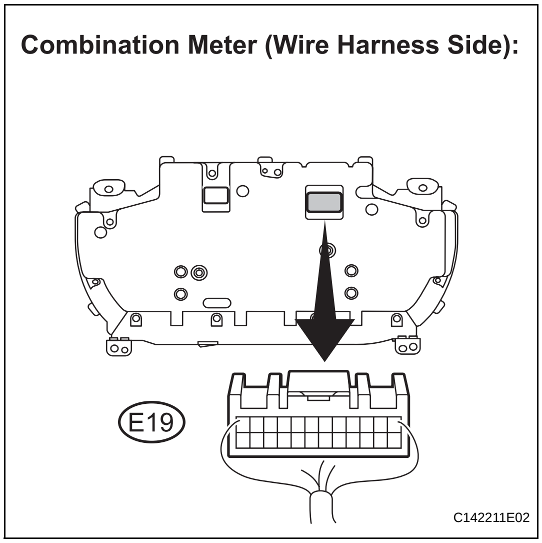
OK

5 RECONNECT CONNECTOR

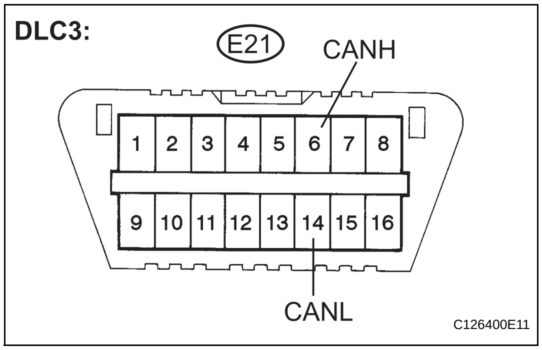
(a) Reconnect combination meter main bus wire connector E48 to the CAN No. 2 J/C "B" side (without earth terminal).

NEXT

6 CHECK FOR SHORT IN CAN NO. 1 BUS WIRE (COMBINATION METER)



(a) Disconnect combination meter connectoE19.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E21-6 (CANH) - E21-14 (CANL)	Engine switch off	108 to 132 Ω

HINT:
If the resistance changes to 1 MΩ or more when the connector is disconnected, there may be a short in the ECM.

NG **REPAIR OR REPLACE CAN NO. 1 BUS MAIN WIRE OR CONNECTOR (COMBINATION METER MAIN BUS WIRE)**

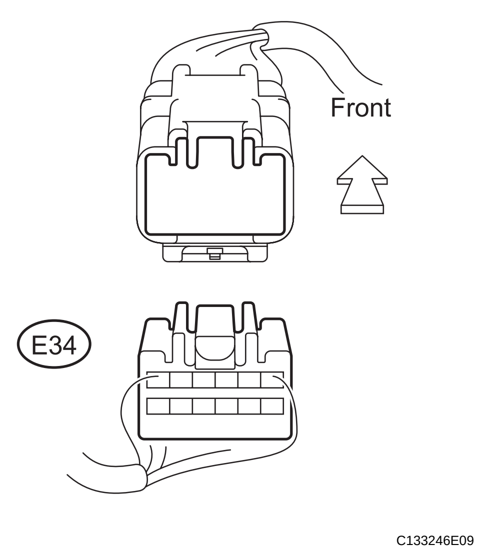
OK

REPLACE COMBINATION METER (See page ME-66)

7 CHECK FOR SHORT IN CAN NO. 1 BUS WIRE (CAN NO. 5 J/C - CAN NO. 2 J/C)

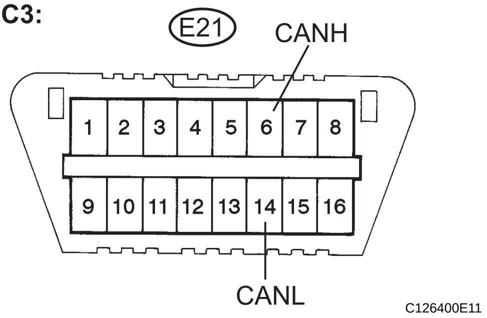
(a) Reconnect CAN No. 2 J/C connector E42.

CAN No. 5 J/C Connector (Rear of the Vehicle) Wire Harness Side View:



(b) Disconnect CAN No. 5 J/C connector E34.

DLC3:



(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

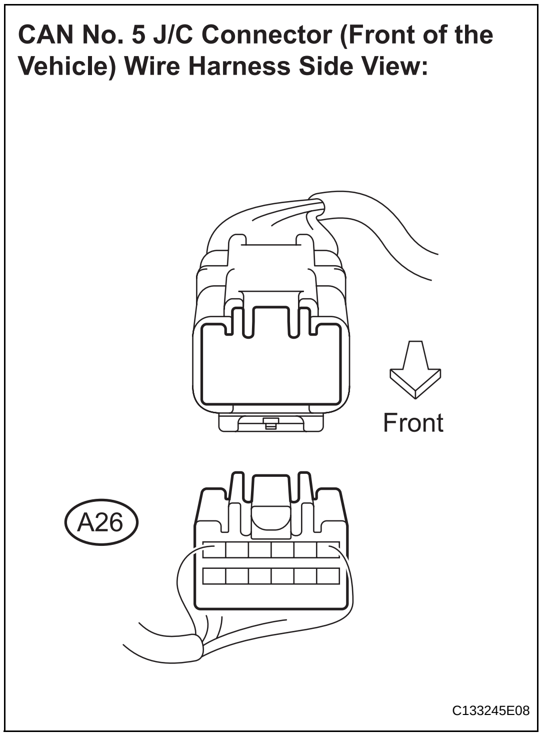
Tester Connection	Condition	Specified Value
E21-6 (CANH) - E21-14 (CANL)	Engine switch off	108 to 132 Ω

NG → **REPAIR OR REPLACE CAN NO. 1 BUS MAIN WIRE OR CONNECTOR (CAN NO. 2 J/C - CAN NO. 5 J/C)**

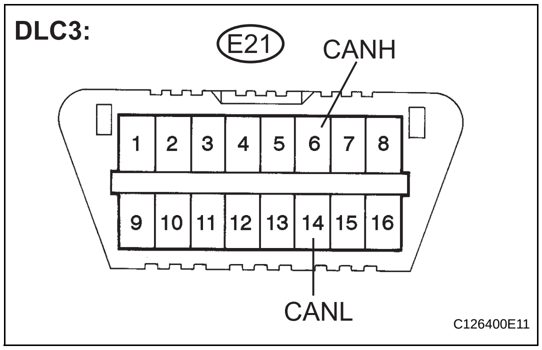
OK

8 CEHCK FOR SHORT IN CAN NO. 1 BUS WIRE (CAN NO. 5 J/C - CAN NO. 2 J/C)

(a) Reconnect CAN No. 5 J/C connector E34.


CAN No. 5 J/C Connector (Front of the Vehicle) Wire Harness Side View:

(b) Disconnect CAN No. 5 J/C connector A26.


DLC3:

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E21-6 (CANH) - E21-14 (CANL)	**Engine switch off**	**108 to 132 Ω**

OK **Go to step 10**

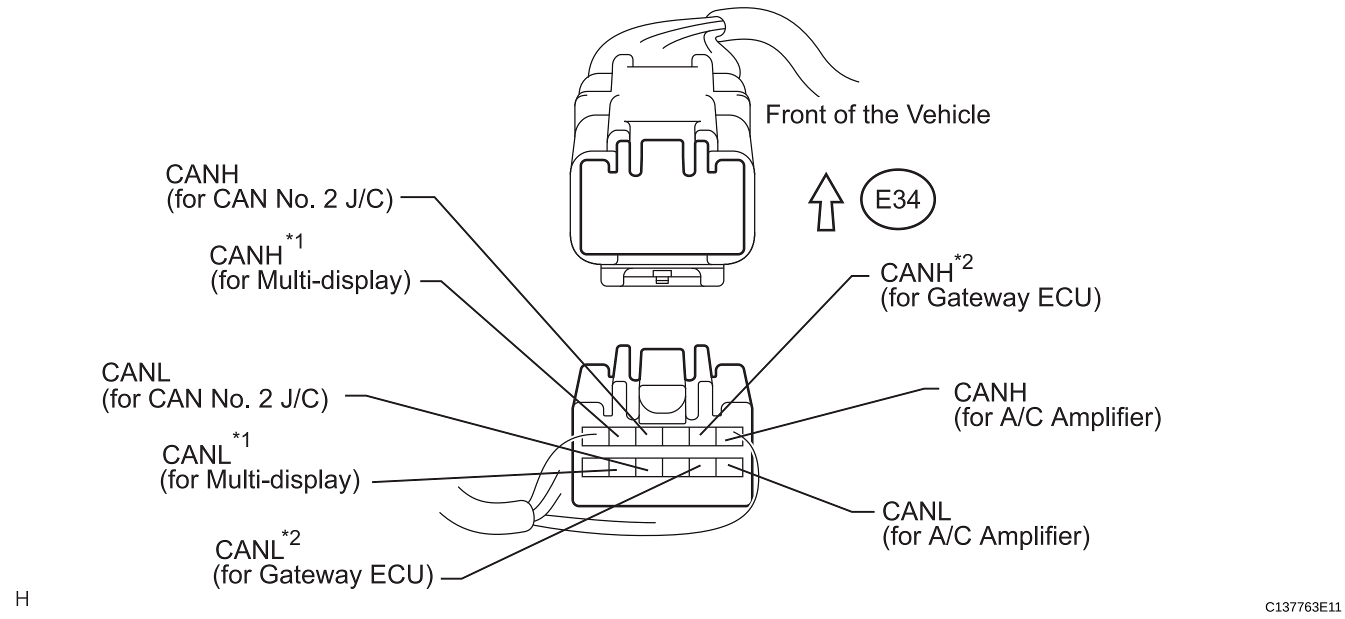
NG

9 CHECK FOR SHORT IN CAN NO. 1 BUS WIRE (CAN NO. 5 J/C WIRE)

(a) Reconnect CAN No. 5 J/C connector A26.

(b) Disconnect CAN No. 5 J/C connector E34.

CAN No. 5 J/C (Rear Side of the Vehicle) Wire Harness View:



(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Destination	Condition	Specified Value
E34-1 (CANH) - E34-7 (CANL)	A/C amplifier	Engine switch off	More than 1 Ω
E34-2 (CANH)*2 - E34-8 (CANL)*2	Gateway ECU*2	Engine switch off	More than 1 Ω
E34-5*1 (CANH) - E34-11*1 (CANL)	Multi-display*1	Engine switch off	More than 1 Ω

HINT:
- *1: with Navigation system
- *2: with AFS, dynamic radar cruise control system or pre-collision system

NG → **Go to step 12**

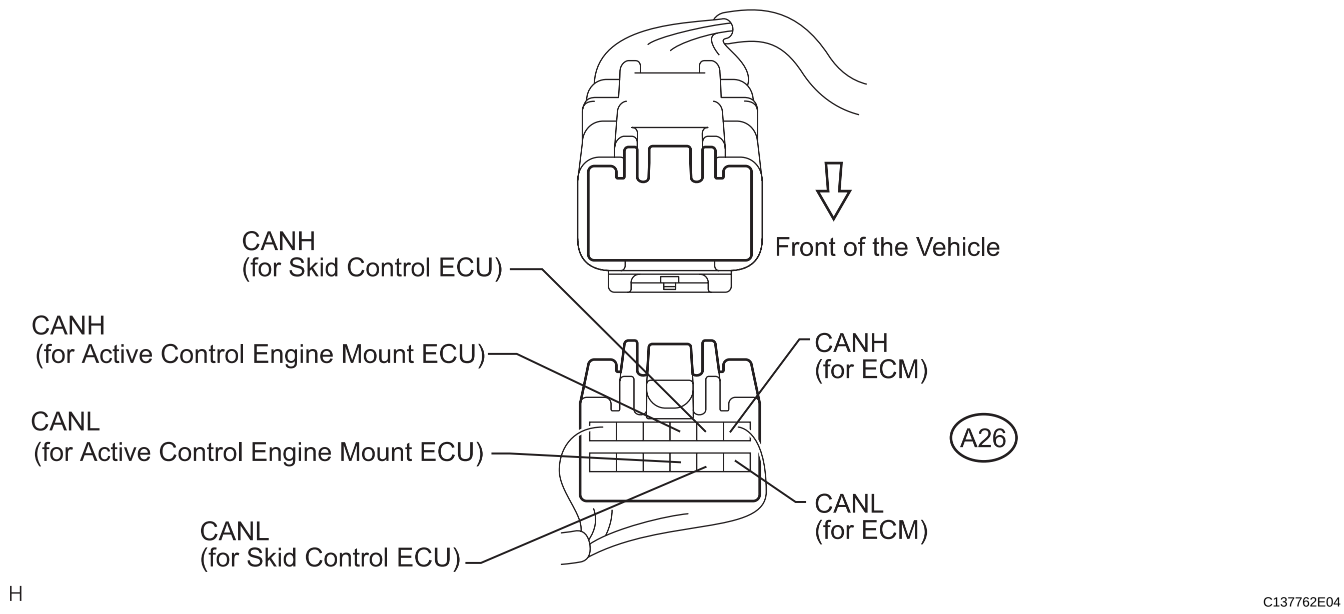
OK

REPLACE CAN NO. 5 J/C

10 CHECK FOR SHORT IN CAN NO. 1 BUS WIRE (CAN NO. 5 J/C WIRE)

(a) Disconnect CAN No. 5 J/C connector A26.

CAN No. 5 J/C (Front Side of the Vehicle) Wire Harness View:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Destination	Condition	Specified Value
A26-1 (CANH) - A26-7 (CANL)	ECM	Engine switch off	108 to 132 Ω
A26-2 (CANH) - A26-8 (CANL)	Skid control ECU	Engine switch off	More than 1 Ω
A26-3 (CANH) - A26-9 (CANL)	Active control engine mount ECU	Engine switch off	More than 1 Ω

Result

Result	Proceed to
OK	A
NG (Short in wires other than those connected to the ECM)	B
NG (Short in wires connected to the ECM)	C

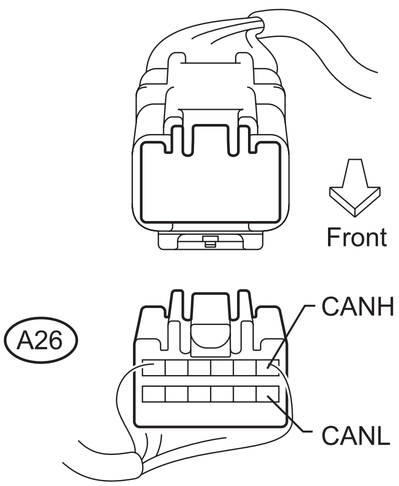
A **REPLACE CAN NO. 5 J/C**

B **Go to step 12**

C

11 CHECK FOR SHORT IN CAN NO. 1 BUS WIRE (ECM MAIN BUS WIRE)

CAN No. 5 J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E07

(a) Disconnect ECM connector A10.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A26-1 (CANH) - A26-7 (CANL)	**Engine switch off**	**1 MΩ or higher**

HINT:
Measure the resistance with CAN No. 5 J/C connector A26 disconnected.

NG → **REPAIR OR REPLACE CAN NO. 1 BUS MAIN WIRE OR CONNECTOR (ECM - CAN NO. 5 J/C)**

OK

REPLACE ECM (See page ES-542)

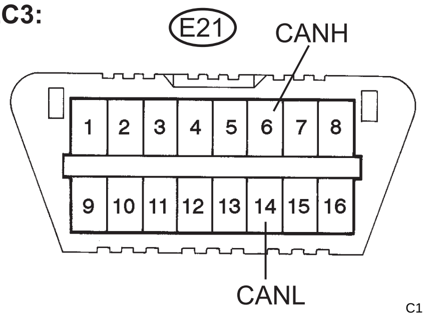
12 RECONNECT CONNECTOR

(a) Reconnect the connector for the short-circuited branch wire to the CAN No. 2 J/C or CAN No. 5 J/C (the connector that caused the bus wire resistance to become normal (between 54 and 69 Ω) when it was disconnected).

NEXT

13 CHECK FOR SHORT IN CAN NO. 1 BUS WIRE

DLC3:



C126400E11

(a) Disconnect the connector that includes terminals CANH and CANL from the ECU (or sensor) to which the short-circuited branch wire is connected. (See page CA-15)

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E21-6 (CANH) - E21-14 (CANL)	**Engine switch off**	**1 MΩ or higher**

HINT:
If the resistance becomes normal (between 54 and 69 Ω) when the connector is disconnected from the ECU (or sensor), there may be a short in the ECU (or sensor).

NG

REPAIR OR REPLACE CORRESPONDING ECU OR SENSOR BRANCH WIRE OR CONNECTOR

OK

REPLACE CORRESPONDING ECU OR SENSOR